Carbon & energy management on eco-industrial parks

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I. Introduction

July the 5th 2007 the Flemish government published the amended regulation concerning public co-financing of the (re)development of industrial and business sites in Flanders. Guided by the emergent driving force of sustainable energy policy, the legal requirements incorporate carbon neutrality (CO2N), denoted as zero carbon dioxide gas emission in electricity consumption [1].

At that time however, neither site developers nor the Flemish administration itself knew how to translate the carbon neutrality prerequisite into practical requirements, strategies and enforcement methods. Hence, site developers and researchers anticipated with first steps to carbon neutrality constraints and services in business cluster environments.

This doctoral study scrutinises the CO2N regulation and implementation, reviews the current and future Flemish practices and elaborates on the wide spectrum of park management and site development opportunities based on the Trias Energetica principle [2]. The concept of carbon neutrality is considered to be highly potential in view of a more attendant, qualitative and entrepreneurial park management, that -in turn- will lead to more (eco)efficient businesses, moving towards eco-industrial parks.

II. Eco-industrial parks - Flemish focus

Referring to international literature, eco-industrial parks primarily focus on inter-company exchanges of energy and by-products [3][4]. In Flanders, however, the spearhead area of policy aimed at the design and management of business sites [5]. Likewise a broad range of inter-company projects in the Triple P context, defined by Elkington, is supported, added with EU funding [6][7].

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III. First carbon neutrality initiatives

Since the explicit target for a sustainable energy and climate policy in industrial clusters in 2007, Flemish site developers and managers are inclined, even assured to support the carbon neutrality initiative of the Flemish government. Pioneers seek a pragmatic translation of the legal requirements, pondering the options to reach for carbon neutrality, the controlling procedure and the enforcement strategy.

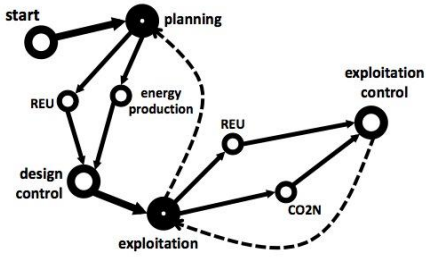

Figure 1. Carbon neutrality procedure

They recognise the need for a broader perspective, taking into account also flanking measures on rational energy use (REU) as well as onsite production of green electricity (figure 1). The latter aim at reducing the extra costs that might come with a purchase of green electricity, possible greening through renewable energy guarantees of origin or emission compensation.

A minimum set of expectations for all developers by regional or higher governments is considered useful to initiate a positive strive among site developers. Facultative flanking measures and site manager services open up the opportunity to distinguish supremacy within business parks. New and altered strategies in the carbon neutrality move should be introduced, e.g. park management services to balance the risen investment costs, a managerial strategy to encourage the implementation of carbon neutrality standards, rather than relying on legal enforcement afterwards [5].

IV. Activating park management

Despite the incentives supra, the overall approach on business sites still is rather passive. Developers and managers still rely on additional regulation, passive support - such as quick scans in REU and alternative energy production - and simple individual actions of enterprises.

Collective production opportunities, however, is regarded as a welcome approach of energy sustainability. It moreover gains interest when enterprises lack the technical ability to invest in sufficient renewable power for their operation, or when a local renewable multi-MW plant is able to reduce the total investment cost. Likewise, cluster plants may produce renewable energy for enterprises located on micro- or mesoparks, where spatial and environmental constraints can hinder energy production. Current research is directed to the legal, fiscal, economic, organisational and technical settings for implementation, dealing with the position of park management too [8].

The park manager is positioned much closer to the onsite enterprises then the (sub)regional government, and certainly the federal or European bodies that dictate the environmental performance laws and eventually provide (co)funding for corporate environmental investments. The park manager, moreover, is the linking person in between. He operates as a first information desk as well as a motivator, a coach, a network broker to encourage joint projects, even system changes with enhanced and combined economic, social and environmental profit. Besides, business park management is entitled to outsource tasks, leading to specialisation, and simultaneously operate in an area specific as well as regional way [9].

V. Future perspectives

Local collective energy production physically induces the need for microgrids on green industry parks. The latter are regarded to offer the opportunity to lower distribution costs, to function in island mode, to reach for higher power quality and to balance production and consumption or store renewable energy [10]. Research is directed towards the legal, technical and overal managerial project setup and boundary settings.

Likewise, the Flemish business propensity towards CO2N, aligned with knowledge accumulation in collective energy production, starts to penetrate into cluster projects in energy exchange. For mixed industry parks energy exchange is considered readily attainable, based on experience concerning exchange of materials. Hence, the core focus of eco-industrial parks is gaining ground.

Further decarbonisation is feasible when broadening the CO2N requirement to other sources of carbon emission, such as heating and cooling systems, production processes and products, goods and commuter transport, etc. Even existing industrial and business sites are to be searched, since today the CO2N regulation is only focused on electricity consumption and new company lots. All greenhouse gas emissions should be taken into consideration.

Acknowledgements

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